



Environmental Collaborations:

Nationally and Across the Globe

Dr. Charles Groat
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U.S. Department of the Interior
U.S. Geological Survey

Shortcomings of Current Earth Observation Efforts

- Lack of access to data and associated benefits in the developing world
- Eroding technical infrastructure
- Large spatial and temporal gaps in specific data sets
- Inadequate data integration and interoperability
- Uncertainty about continuity of observations
- Inadequate user involvement
- Lack of relevant processing systems to transform data into useful information

Global Earth Observation System of Systems (GEOSS)



A distributed system of systems

- Improves coordination of strategies and observation systems
- Links all platforms: *in situ*, aircraft, and satellite networks
- Identifies gaps in our global capacity
- Facilitates exchange of data and information
- Improves decision-makers' abilities to address pressing policy issues

Earth Observation Summits

EOS-I	Washington, DC	July 2003
EOS-II	Tokyo	April 2004
EOS-III	Brussels	February 2005



GEO now consists of nearly 60 Member countries and the EC, and more than 40 Participating Organizations

GEOSS Development Process

- *Ad hoc* Group on Earth Observations (GEO) established at EO Summit I to guide development of GEOSS 10-Year Implementation Plan
- GEO led by 4 Co-Chairs: U.S., Japan, South Africa, European Commission
- 6 GEO meetings held around the world to track progress, plan for permanent GEO governance
- Priority given to involve developing countries, seek advice/input from users and scientific/technical community

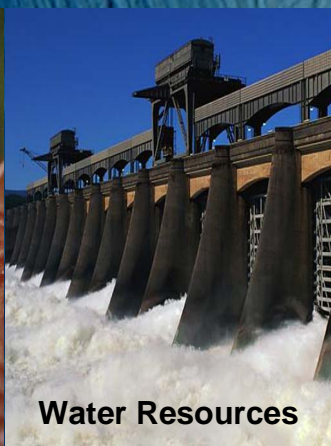
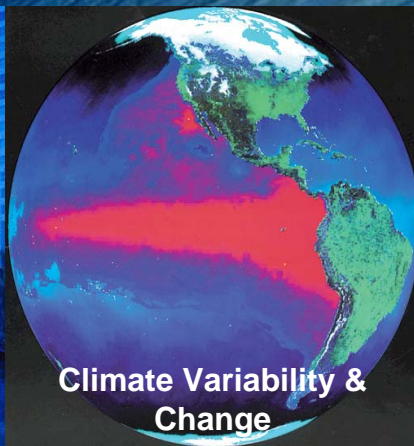
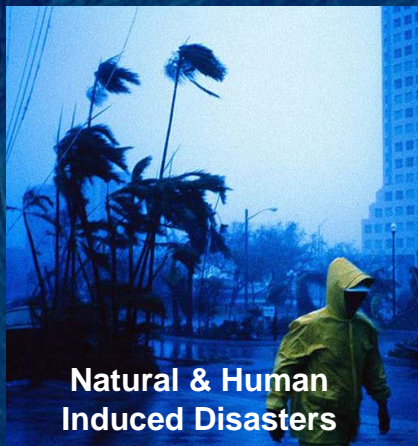
Outcomes of EO Summit III

- **Endorsed the GEOSS 10-Year Implementation Plan**
- **Established permanent GEO to guide implementation of plan; Secretariat to be hosted by WMO in Geneva**
- **Adopted a Communiqué supporting Tsunami and Multi-Hazard Warning Systems within the context of GEOSS**

First Meeting: GEO I (May 2-3)

- Iceland recognized as newest member of growing effort
- GEO agreed to 12 member Executive Committee

GEOSS Focus: 9 Societal Benefits of Improved Earth Observation



Natural & Human Induced Disasters

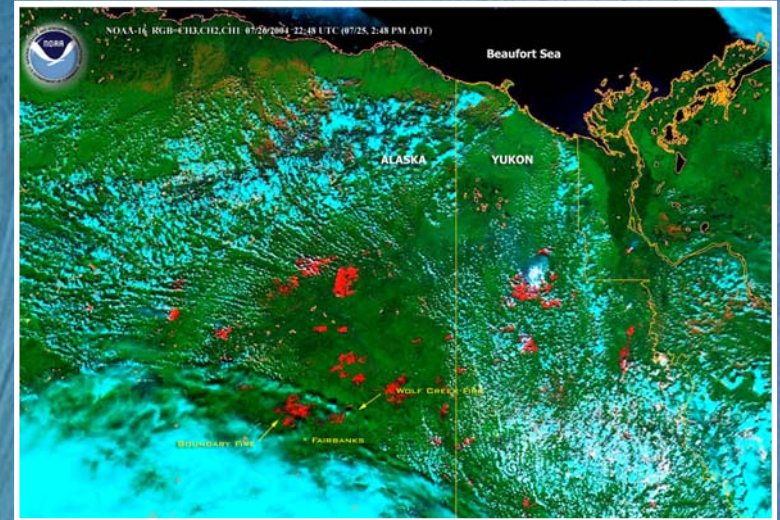


- Afflict all regions of the world
- Disasters killed 500,000 people and caused \$750 billion in damages during 1990-1999



Wildfires

- Global & Local Implications
 - Better prediction and tracking of fires
 - Improved tracking of smoke plume direction & air quality effects
 - Improved response and recovery



Terrestrial, Coastal, and Marine Ecosystems

- Includes strengthening of an ocean observation system for region
 - Critical for addressing pollution, habitat degradation, natural disasters
- Benefit: Healthy, well-managed and productive marine and coastal ecosystem
 - Basis for economic development and social well-being



Improve Human Health & Well-Being

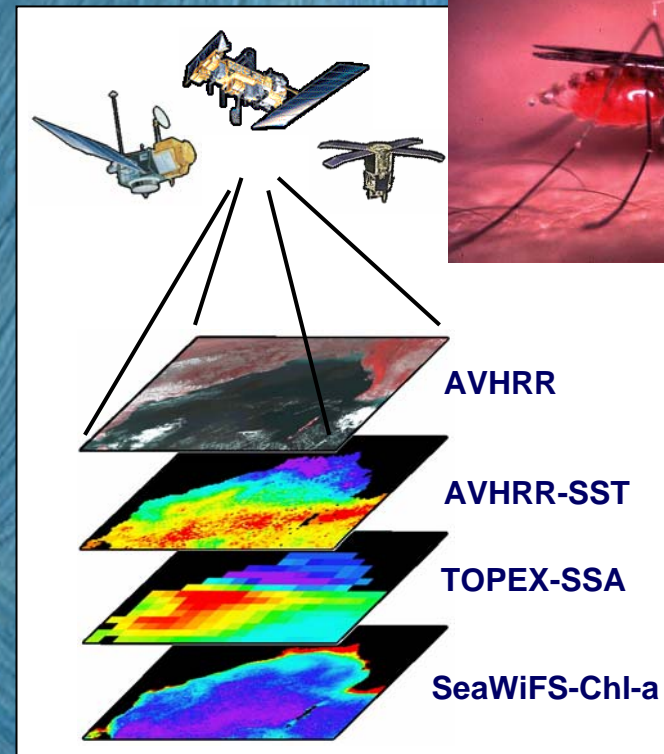
Malaria killed more than a million people in 2003

- Primarily in developing world

Early warning system components

- Temperature
- Humidity
- Vegetation
- Soil Moisture

Possible outbreak prevention



Support Sustainable Agriculture



- Help predict & understand droughts, harvests, potential crop damage
- Make decisions based on sustainable agriculture practices
- Worldwide benefits to agriculture \$450-550M annually

Combat Desertification & Drought

Worldwide implications

- Asia particularly prone to desertification & drought
- Affects agriculture production, water supply, & wildfires



GEOSS Recommendation

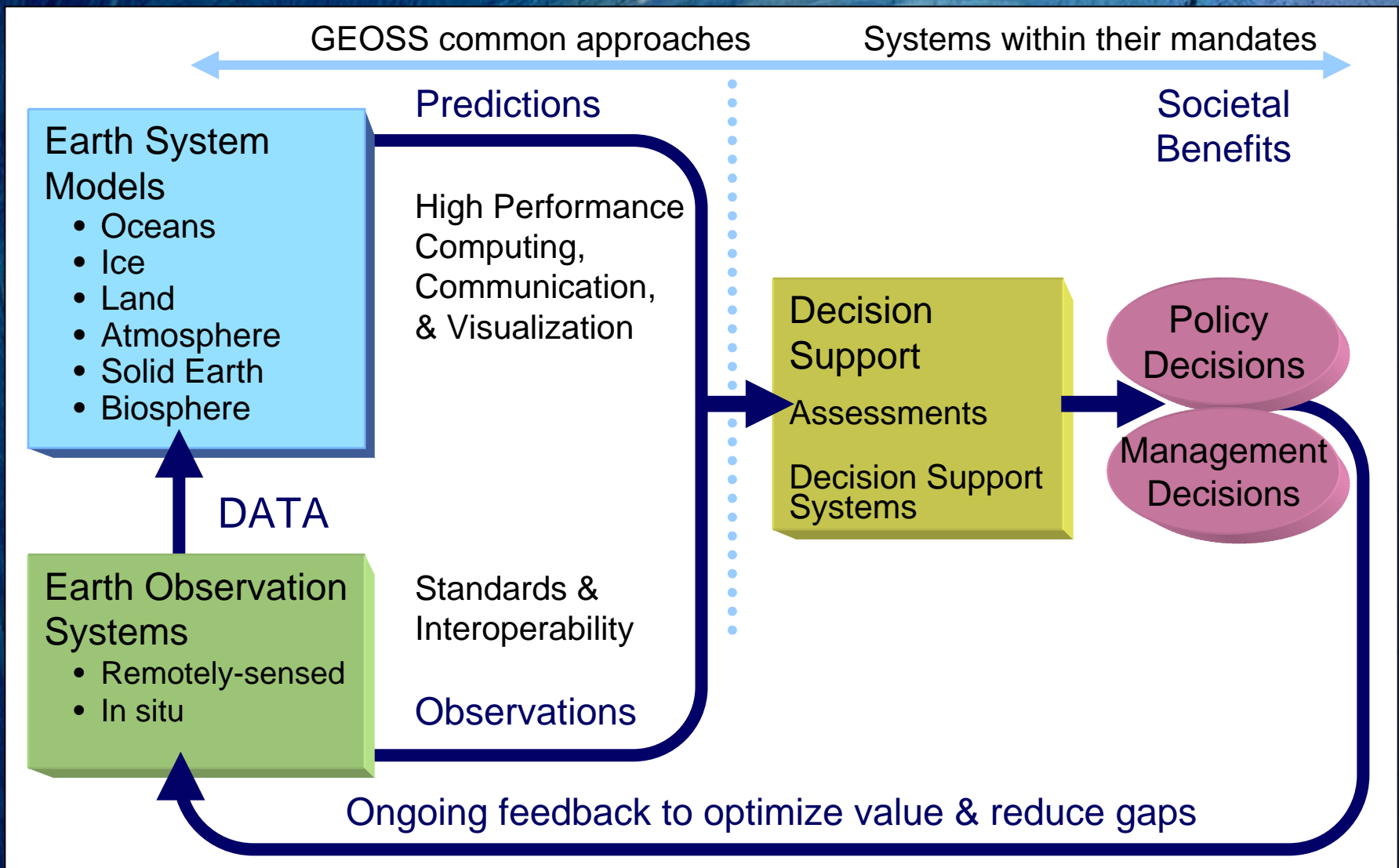
- Fully integrate in situ & satellite observations
- On-time drought early warning system

Improve Energy Resource Management

- **Gulf of Mexico**
 - 49% of oil refined for U.S. comes through Gulf of Mexico refineries
 - 60% of imports come through Gulf of Mexico ports
- **Value of improved hurricane forecast information**
 - \$10.5 million for 24 hour forecast
 - \$8.1 million for 48 hour forecast
 - Exceeds operating budget of National Hurricane Center



GEOSS Architecture



U.S. Contribution to GEOS: Strategic Plan for the U.S. Integrated Earth Observation System (IEOS)

VISION:

Enable a healthy public, economy, and planet through an integrated, comprehensive, and sustained Earth observation system



STRATEGIC PLAN FOR THE U.S. INTEGRATED EARTH OBSERVATION SYSTEM



Interagency Working Group on Earth Observations
NSTC Committee on Environment and Natural Resources



Strong National Support

- Department of Commerce
NOAA, NIST
- Department of Defense
- Department of Energy
- Department of Health & Human Services
National Institute of Environmental Health Sciences
- Department of Homeland Security
FEMA
- Department of the Interior
US Geological Survey
- Department of State
- Department of Transportation
- Environmental Protection Agency
- National Aeronautics and Space Administration
- National Science Foundation
- Smithsonian Institution
- Tennessee Valley Authority
- U.S. AID
- U.S. Department of Agriculture
ARS, USFS
- White House Council on Environmental Quality
- White House OMB
- White House Office of Science & Technology Policy

Near-Term Opportunities

- **Data Management System for Earth Observations**
- **Improved Observations for Disaster Warnings**
- **Global Land Observing System**
- **Sea Level Observing System**
- **National Integrated Drought Information System**
- **Air Quality Assessment and Forecast System**

IEOS Focus: 9 Societal Benefits



Loss of Life & Property



Protect and Monitor Our Ocean Resource



Climate Variability & Change



Sustainable Agriculture and Forestry



Combat Desertification & Drought



Human Health & Well-Being



Ecological Forecasts



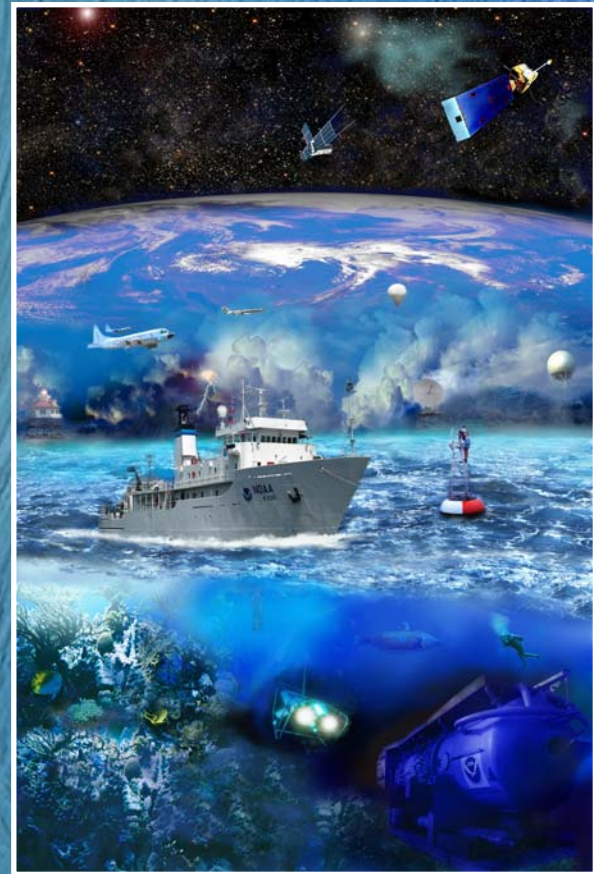
Protect & Monitor Water Resources



Monitor & Manage Energy Resources

Role for Geospatial Data Community

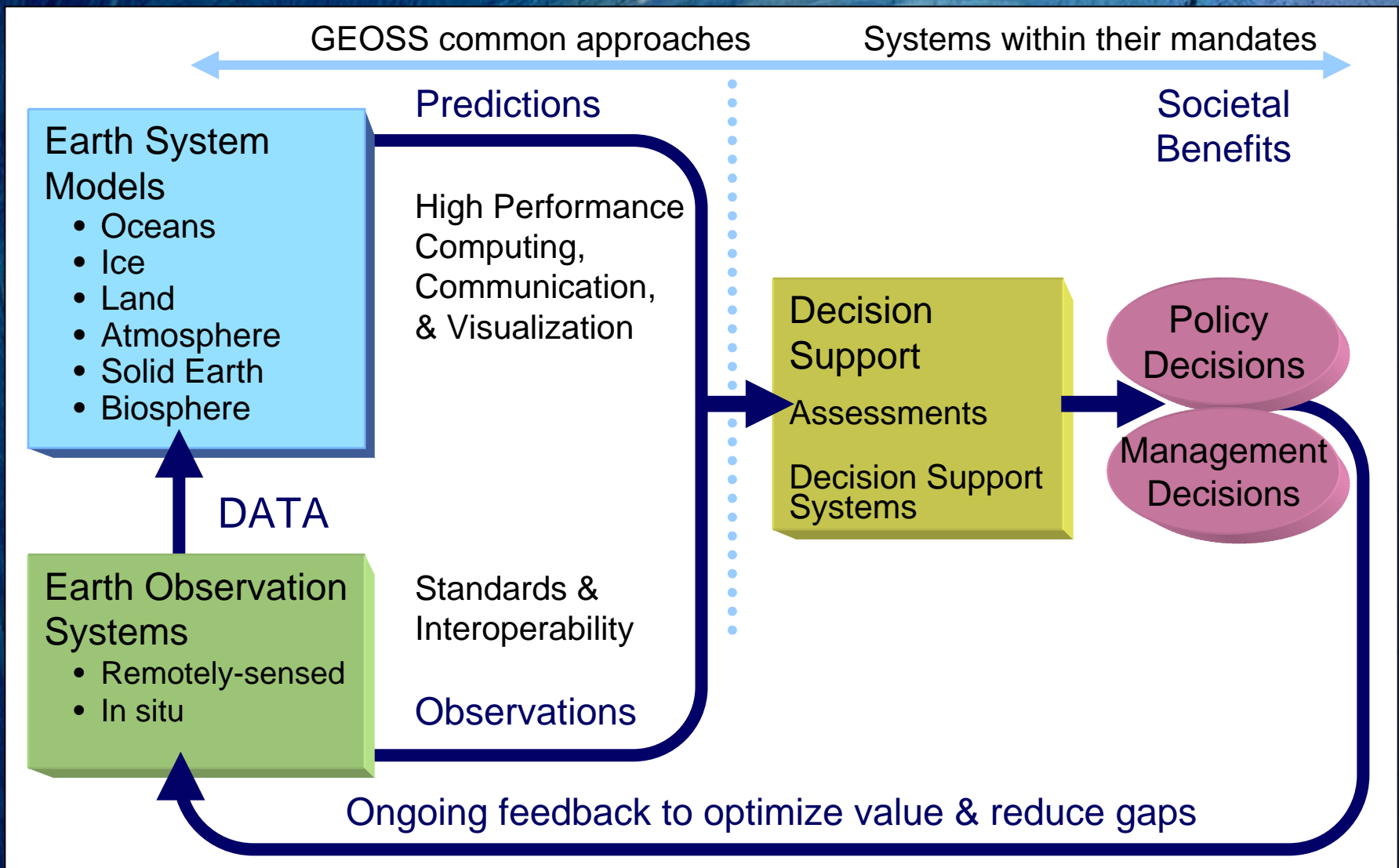
- Provide global, regional, and national framework data to underpin GEOSS.
- Ensure long-term continuity of operational US Earth observation capabilities: land, atmosphere, ocean
- Support U.S. and international spatial data initiatives, e.g. GSDI, NSDI, Global Map



Education, Technology Transfer, Outreach

- Encourage development of university courses and research that develop skills in the integrated use of remote and in situ observation systems
- Translation of technical data and products to tools that support decision-making related to societal needs by those who make these kinds of decisions
- Improve interactions between the technical elements and other aspects of societally-relevant decisions: social, economic, political, cultural

GEOSS Architecture



Earth Observation Information

- **INTERNATIONAL:** Intergovernmental Group on Earth Observations (GEO)

<http://earthobservations.org>

- **UNITED STATES:** Interagency Working Group on Earth Observations

<http://iwgeo.ssc.nasa.gov>